THE POSSIBLE WAYNE COUNTY FARM

OHIO
Agricultural Experiment Station

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BULLETIN *304*

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THE POSSIBLE WAYNE COUNTY FARM

C. E. THORNE

Average yields.—The statistics collected by the township assessors of Ohio show that the average production in Wayne County of the principal crops for the 10 years, 1905-1914, was as follows:

TABLE I.—Average Wayne County crops.

Crop	Acreage	Total yield	Yield per acre
Corn	37,671	1,499,801 *Bu.*	39.81 *Bu.*
Oats	31,087	1,149,018 "	36.96 "
Wheat	44,948	868,252 "	19.33 "
Clover	22,752	31,165 *T.*	1.37 *T.*
Meadow	30,873	43,041 "	1.40 "
Potatoes	7,973	759,513 *Bu.*	95.00 *Bu.*

This table shows a total of 175,304 acres in the usual farm crops for the county. A comparison with the U. S. Census statistics for 1910 shows that the actual acreage and total yields were probably about 10 percent greater than those reported by the assessors, but this does not materially affect the present calculation.

The Census statistics show that in 1909 there were the following animals on the Wayne County farms, not including calves, lambs and pigs: 13,904 mature horses and mules, 20,229 mature cattle, 6,010 yearling cattle, 1,049 yearling colts, 20,289 mature hogs and 23,208 mature sheep.

If we count two yearling cattle or colts and 10 hogs or sheep as equivalent to one cow or horse in manure production, there was the equivalent of 42,000 mature cattle in the county that year, which

would have produced approximately 200,000 tons of manure during the 6 months when they were kept in stable or barnyard, or somewhat more than a ton for each acre in cultivation.

The assessors' statistics also show that the farmers of the county used an average of 5,268 tons of commercial fertilizers annually during this period, costing $110,381, the quantity increasing quite steadily from 4,856 tons in 1905 to 7,012 tons in 1914. This would represent an annual application of fertilizers of about 60 pounds per acre, or 300 pounds for each 5-year rotation, if it is assumed that the cereal and hay crops are grown in a more or less systematic rotation.

The assessors' statistics throw no light upon the composition of the fertilizers used in the county except in the cost given, which amounts to an average of $20.57 per ton for the 10-year period. Such a cost would indicate the general use of fertilizers containing 1 to 2 percent each of nitrogen and potash, with 8 to 9 percent of phosphoric acid.

At the Experiment Station a 5-year rotation of corn, oats, wheat, clover and timothy has been maintained since 1894, in which part of the land has been left without any manure, while part has received manure or other fertilizing materials. The fertilizer application which probably most nearly corresponds in effectiveness to the average fertilizer used in Wayne County has been made up of 300 pounds of dried blood, 480 pounds of acid phosphate and 260 pounds of muriate of potash and has been distributed over the corn, oat and wheat crops at the rate of 1,100 pounds per acre for each 5-year rotation. The increase from 100 pounds of this fertilizer used on unlimed land has averaged 2.14 bushels of corn, 1.91 bushel of oats, 1.05 bushel of wheat, 74 pounds of clover hay and 60 pounds of timothy hay for the 10 years, 1905-1914. This fertilizer has contained more nitrogen and potash than those ordinarily used by Wayne County farmers and has contained no "filler." If we assume that the fertilizers used by the Wayne County farmers have been equally effective, the average increase due to the 300 pounds of fertilizer per acre used during each 5-year period will amount to 6.42 bushels of corn, 5.73 bushels of oats, 3.15 bushels of wheat, 222 pounds of clover and 180 pounds of timothy hay per acre.

When yard manure has been applied to corn and wheat at the Experiment Station at the rate of 8 tons per acre to each crop, or a total of 16 tons per acre for each 5-year period, the 10-year average increase for each ton of manure has been 2.05 bushels of corn, 0.94 bushel of oats, 1.02 bushel of wheat, 137 pounds of clover hay and

140 pounds of timothy hay. At this rate the 5 tons of manure used per acre for each 5-year period by the Wayne County farmer would produce 10.25 bushels of corn, 4.70 bushels of oats, 5.10 bushels of wheat, 685 pounds of clover hay and 700 pounds of timothy hay.

By adding these presumptive increases together and subtracting their sum from the average Wayne County yields, we have the results shown below, parallel with which are shown for comparison the 23-year average yields harvested at the Station on land that has had no manure and but one partial dressing of lime.

TABLE II.—Average Wayne County yields per acre compared with yields at Experiment Station.

	Corn	Oats	Wheat	Clover	Timothy
	Bu.	*Bu.*	*Bu.*	*Lb.*	*Lb.*
Average Wayne County yields	39.81	36.96	19.33	2,740	2,800
Yields due to 300 lb. fertilizer	6.42	5.73	3.15	222	180
Yields due to 5 tons manure	10.25	4.70	5.10	685	700
Total	16.67	10.43	8.25	907	880
Probable unaided yield	23.14	26.53	11.08	1,833	1,920
Unaided yield at Experiment Station for same period	22.05	27.35	13.43	1,348	2,460

The total yield of the two hay crops has been 3,753 pounds for the county and 3,808 pounds at the Station. Taken as a whole, these calculated yields for the county and actual yields for the Station agree so closely as to fully justify the assumption that the treatment practiced at the Experiment Station may be followed on the average Wayne County farm with a reasonable expectation of obtaining results similar to those reached at the Station.

Proper fertilizer mixtures increase crop yields.—Let us now consider what should happen if the average soil of Wayne County were to receive the treatment given at the Experiment Station and were to respond proportionately. The formula mentioned above has been much more effective when nitrate of soda has been substituted for the dried blood, a mixture of 240 pounds of nitrate of soda, 480 pounds of acid phosphate and 260 pounds of muriate of potash having increased the average yield by 3½ bushels of corn, 3¼ bushels of oats, 2 bushels of wheat, 260 pounds of clover hay and 240 pounds of timothy hay for each 100 pounds of the mixture.

Table III shows the actual yields produced by this mixture reinforced with 2 tons of ground limestone, together with the additional quantity of similar fertilizer that would probably be required to raise the Wayne County average crops to the same yield.

TABLE III.—Possible crop yields in Wayne County.

	Corn	Oats	Wheat	Clover	Timothy
	Bu.	*Bu.*	*Bu.*	*Lb.*	*Lb.*
Actual Station yields	57	59	33	3,960	4,800
Actual county yields	40	37	19	2,740	2,800
Difference	17	22	14	1,220	2,000
Yield for 600 lb. fertilizer	21	20	12	1,560	1,440
Possible county yields.	61	57	31	4,300	4,200

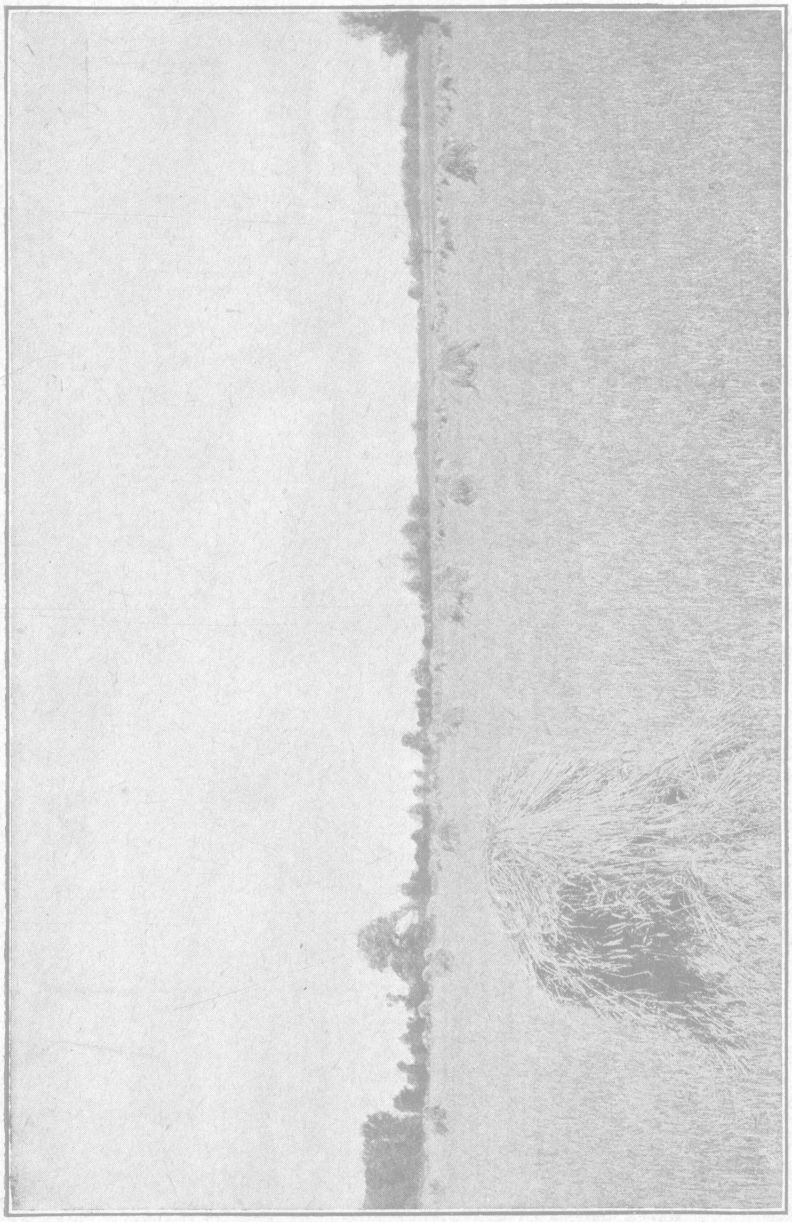
With corn at 50 cents per bushel, oats at 40 cents, wheat at 90 cents and hay at $10 per ton, the present Wayne County crops are worth $15.90 per acre each year, while the Station crops are worth $25 annually, a difference of more than $9 per acre annually.

The 600 pounds of fertilizer would cost about $11 for each 5-year period, and the limestone about $5, a total of $16, or $3.20 annually; and the cost of harvesting the extra crops, at 10 cents a bushel for the grains and $1 a ton for the hay, would be about $1.30 annually, or a total of $4.50. This leaves $4.50 per acre annually as clear gain, or a total of $787,000 for the 175,000 acres cultivated in Wayne County.

The yields above given are not the largest that are being obtained at the Station. Four 10-acre fields that are being cropped in a 4-year rotation have given 12-year average yields of 77 bushels of shelled corn, 60 bushels of oats, 34 bushels of wheat and 3⅕ tons of clover hay, at a cost for treatment of 10 tons per acre every 4 years of manure reinforced with 40 pounds per ton of rock phosphate, followed by 2 tons of ground limestone and about 400 pounds of fertilizer, the manure and limestone being applied to the corn crop and the fertilizer to the wheat. The total cost per acre of this treatment, with manure at $1 per ton, follows:

10 tons manure	$10.00
400 pounds acid phosphate[1]	3.00
2 tons ground limestone	5.00
400 pounds complete fertilizer	6.00
Total cost	$24.00
Annual cost	6.00

[1]Rock phosphate was actually used in this test, but this estimate is based on acid phosphate as being the material most accessible to the farmer and enough more effective to justify its additional cost.



A Wayne County wheatfield

On the same basis of valuation employed above the total value of the crops for each 4-year period has been $125, or $31 annually. After deducting $2 annually for the extra cost of harvesting the larger crops, we find a net annual gain over Wayne County's average of more than $6 per acre, representing a total possible gain for the county of more than a million dollars annually.

Possible objections to increased yields.—The objection will be raised that it is not possible to apply this scheme of crop improvement to Wayne County for the following reasons:

1. The scheme involves an increased expenditure for fertilizers and lime amounting to more than $4 per acre annually, and farmers do not have the necessary money.
2. Much extra help would be required to take care of the additional crops produced, and it is almost impossible to procure sufficient help for present needs.
3. Even if the money and labor were available, experience has shown that large crops bring less money than small ones. Such yields would glut the market.
4. The Station's experiments are made on drained land, while much of Wayne County land is insufficiently drained.

Financial outcome.—The reply to the first objection is that the Station's work has shown that such an investment would assuredly be returned within a year with nearly 100 percent interest. Hundreds of thousands of dollars are going out of Wayne County every year to be loaned at 7 percent, and any farmer of character can borrow the money required for the improvement of his land at that rate or less.

Crops may be grown on smaller area.—The reply to the other three objections is that Wayne County's present crops might be grown on two-thirds the area now devoted to them, and at a smaller expenditure of time, labor and money; and, therefore, it would be better to abandon the wettest and least productive third of each farm and let it grow up to weeds and briars and to concentrate upon the other two-thirds the labor and energy that is now being wasted in going over land that cannot by any possibility produce a full yield.

Let us do some "figuring" on this last proposition: The U. S. Census statistics for 1910 show that there were at that time 3,955 farms in Wayne County, having an average size of 85.2 acres. About 50 acres of the average farm was in cultivation, the remainder being pasture, woodlot, roadways, building lots, orchards, etc. If the Census figures are taken for areas in the different crops

and the assessors' returns for average rate of production, the 10-year average production of the principal crops for the average Wayne County farm may be stated as below:

TABLE IV.—Average production of Wayne County farms.

Crop	Acreage	Yield per acre	Total yield	Value*
Corn	10.9	39.81 *bu.*	434 *bu.*	$217
Oats	8.2	36.96 "	303 "	121
Wheat	13.1	19.33 "	253 "	228
Hay	14.1	1.40 *T.*	19.7 *T.*	197
Total	46.3			763

*Corn is computed at 50 cents per bushel, oats at 40 cents, wheat at 90 cents, and hay at $10 per ton.

As before stated, it is estimated that these crops have received an average of 1 ton of manure and about 60 pounds of fertilizer per acre annually, the manure and fertilizer, of course, having been applied in larger quantities and on special crops in the rotation.

In the experiments quoted above 16 tons of manure, applied half to corn and half to wheat on each 5-year rotation of corn, oats, wheat, and clover and timothy, has produced increase to the total value of $61, or $3.81 for each ton of manure, while the complete fertilizer used alongside has produced increase worth $2.80 for each dollar expended for it. On this basis a ton of manure may be computed as having a crop-producing value equivalent to a fertilizer of the composition used in this test and costing $1.36. If, now, we reduce the acreage in cultivation on the average farm by one-third, or from 46.3 to 30.8 acres, there will be a ton and a half of manure for each acre instead of only one ton, and if each acre has been receiving 60 pounds of fertilizer there will be 90 pounds for each acre of the reduced area. The ton and a half of manure will be equivalent to $2.04 in fertilizer; and if the 90 pounds of fertilizer be rated at $20 a ton its value will amount to 90 cents, thus leaving the difference between $2.94 and $4.52, or $1.58 per acre, to cover the annual cost of the quantity of fertilizer required to make the dressing equivalent to the smaller one described in the Station test (page 213), in which the total cost of fertilizer and limestone applied in 5 years has amounted to $22.60, or $4.52 annually.

In this calculation the labor cost of production plays an important part. It costs just as much to prepare, plant and cultivate the land and provide the seed for a yield of 40 bushels of corn or 20

bushels of wheat as for twice that quantity, but it costs more to husk or thresh the grain and market the crop. Counting man labor and team labor each at $2 per day without board, and husking or threshing at 10 cents per bushel for corn and wheat and 8 cents for oats—prices for wheat and oats at which contractors in certain sections undertake to thresh the grain, providing and boarding all labor—with 3 cents per bushel for marketing corn and wheat and with 2 cents for oats, we estimate the cost of producing crops on the average Wayne County farm as follows:

	Corn	Oats	Wheat
Grain crops:			
Plowing and fitting	$4.00	$4.00	$4.00
Planting and seeding	.40	.40	.40
Seed	.20	1.00	2.00
Cultivating	2.65	.....	.....
Harvesting and twine	.....	1.00	1.00
Shocking	.....	.40	.40
Total	$7.25	$6.80	$7.80
Husking and threshing (per bushel)	.10	.08	.10
Marketing	.03	.02	.03

	Clover	Timothy
Hay crops:		
Seed and seeding	$1.60	$0.20
Mowing	.60	.60
Raking	.20	.20
Handling	.20	.20
Total	$2.60	$1.20
Hauling in (per ton)	$1.00	$1.00

The corn stover is offset against the cutting. The average cost of producing clover and timothy mixed, would be $1.90 per acre.

On the basis of these estimates the actual and possible output of the average Wayne County farm is computed as follows:

TABLE V.—Estimated actual cost of crop production and value of product on average Wayne County farm.

Crop	Acreage	Cost of production	Cost of harvesting	Total cost	Value of product
Corn	10.9	$ 79.02	$56.42	$135.44	$217.00
Oats	8.2	55.76	30.30	86.06	121.00
Wheat	13.1	102.18	32.89	135.07	228.00
Hay	14.1	26.79	19.74	46.53	197.00
Total cost of labor and seed				$403.10	.....
Additional cost of fertilizers				28.00	.....
Combined total				$431.10	$763.00

TABLE VI.—Estimated cost on two-thirds present area on basis of treatment and yields at Experiment Station.

Crop	Acreage	Cost of production	Cost of harvesting	Total cost	Value of product
Corn	7.3	$52.92	$54.08	$107.00	$208.00
Oats	5.4	36.72	31.80	68.52	127.00
Wheat	8.7	67.86	37.31	105.17	258.00
Hay	9.4	15.70	17.86	33.56	200.00
Total cost of labor and seed				$314.25	.....
Additional cost of fertilizers				49.00	.....
Combined total				$363.25	$793.00

The foregoing calculation is based upon experiments made on plots of one-twentieth acre. These plots are arranged in five series, and the results given are the average of the five repetitions of each comparison. To any one who may doubt the reliability of such tests as a guide to farm practice, when thus repeated and continued over so long a period as these have been, the Station is prepared to offer another test, continued over the same period on four 10-acre fields. In this test, corn, oats, wheat and clover have been grown in rotation, 10 acres in each crop. During the fall the clover sod is covered with manure, applied at the rate of 10 tons per acre, after first being reinforced with phosphate rock or acid phosphate, used at the rate of 40 pounds to the ton of manure, and having been kept under cover until spread on the field. After the manure has been plowed under in the spring, 2 tons per acre of finely ground raw limestone has been applied to the surface and harrowed in; and the wheat has received a fertilizer made up of 200 pounds of acid phosphate, 100 pounds of steamed bonemeal, 50 pounds of muriate of potash and 15 pounds of nitrate of soda, applied in the fall, and followed in the spring with 60 pounds of nitrate of soda, unless the growth seemed so strong as to cause fear of lodging. In fact, the spring dressing of nitrate has been applied 7 times in 12 years.[1]

The outcome of this treatment has been a 12-year average yield of 77 bushels of shelled corn per acre as weighed when husked, followed by 60 bushels of oats, 34 bushels of wheat and 3⅕ tons of hay.

Increasing the production of manure.—If the cultivated area of the average Wayne County farm were reduced by one-third, as assumed in Table VI, and the 30.8 acres thus left were divided into four equal fields there would be 7.7 acres in each field. To furnish

[1]In the beginning of this work the fertilizer consisted of 200 pounds of steamed bonemeal and 100 pounds of acid phosphate, but these quantities have since been reversed.

the 10 tons of manure per acre for one of these fields each year would require a total of 77 tons, or 27 tons more than the average Wayne County farm is now producing during the months of feeding.

The suggestion has been made above that it would be better to abandon the least productive third of the average Wayne County farm to weeds and briars, but there is no danger that the thrifty Wayne County farmer will accept this advice. What he will do is to convert such land into permanent pasture, and thus increase the potential manure supply of his farm. We will assume, therefore, that he will find a way to provide the additional 27 tons of manure that our estimate calls for. Many Wayne County farmers have already found the way.

The phosphating of the manure calls for a total of 400 pounds of phosphate[1] for the 10 tons of manure, and if 200 pounds of acid phosphate, 100 pounds of bonemeal, 50 pounds of muriate of potash and 75 pounds of nitrate of soda are used for each acre of wheat, the total will be 6,352 pounds for the 7.7 acres each of corn and wheat. As shown by the county statistics, the average Wayne County farmer has purchased an average of 60 pounds of fertilizer for each acre in cultivation for the 10 years under review, or 90 pounds for the reduced area now under consideration, or a total of 2,732 pounds for the entire farm. This would leave 3,580 pounds to be purchased, the cost of which at prices prevailing before the European War would be about $54. At present, of course, potassium salts are not obtainable and the cost of other materials is abnormally high, but the potassium while helpful is not absolutely necessary if manure is used liberally. In fact, the Station's later experiments are showing that the lack of potassium may be temporarily overcome by a more liberal use of phosphorus, though this should not be adopted as a permanent practice.

The presumptive outcome of this suggested system of management, therefore, would be as shown in Table VII.

In this case the estimated cost of production is $20 a year greater for the two-thirds area than the present cost for the entire farm (Table VI), but the net income is $179 greater, or more than 20 percent, and enough to cover all the cost of approximately 300 rods of 4-inch tile drain, including purchase and hauling of tile, digging the drain, laying the tile and filling the drain. If the drains are 4 rods apart, a field containing 7.7 acres would require 308 rods

[1]The Station's experiments have shown that it is immaterial whether raw rock phosphate or acid phosphate is used for the reinforcement of manure, the increase from acid phosphate being enough greater than that from raw rock phosphate to offset the difference in cost. Cf. Cir. 144, 86 ff.

of drain. Much of the land in Wayne County would be fairly well drained at this distance, although 2 or 3 rods between drains would generally be a better distance.

TABLE VII.—Estimated outcome of crop production in Wayne County on basis of results on 40-acre tract at Experiment Station.

Crop	Acreage	Cost of production	Extra cost of harvesting	Total cost	Value of product
Corn	7 7	$56	$77	$133	$296
Oats	7 7	52	46	98	185
Wheat	7 7	60	34	94	235
Hay	7 7	20	25	45	246
Total cost of labor and seed				$370	
Additional cost of manure (27 tons @ $1)				27	
Additional cost of fertilizer				54	
Combined total				$451	$962

As estimated in Table V the value of the principal crops grown on the average Wayne County farm is $763, and the cost of production is $431.10, leaving a net balance of $331.90—say $332, or a total of $1,313,160 for the 3,955 farms in the county. As estimated in Table VII the difference between cost of production ($451) and value of produce ($962) would be $511, or a total for the county of $2,021,005—showing the possibility of increasing the net produce of the farms of the county by nearly three-quarters of a million dollars on two-thirds of the area now in cultivation.

CAN THE TENANT FARMER AFFORD TO PURCHASE FERTILIZERS AND LIME?

The Census statistics show that in 1910 one-third of the farms in Wayne County (1,329 farms, or 33.6 percent of all farms, containing 42 percent of the land in farms) were operated by tenants, 75 percent of whom paid their annual rental in a share of the crops. The amount of rental is not shown, but a common share is one-half the crop, the landlord furnishing land, house and half the seed, the tenant furnishing all the labor and delivering the grain in the bushel and hay in the stack or barn. Under such conditions many tenants are reluctant to do anything toward the improvement of the land, even so obvious an improvement as systematic crop rotation being difficult to carry out.

In 1892 the Experiment Station came into possession of a farm which had been rented for 25 years previously. Part of this land was drained in 1893, and the 5-year rotation of corn, oats, wheat, clover and timothy was begun which has been described in previous pages, the average production of which for the 10 years, 1905-1914, is shown in Table II, together with evidence that the production probably fairly represents that of many of the rented farms of Wayne County.

Let us now see what the tenant receives for his labor who cultivates such a farm as this. Taking the average areas in different crops, as shown in Table IV, and applying to these the yields obtained on the untreated land at the Station and given in Table II, we have the outcome shown in Table VIII:

TABLE VIII.—Estimated income from principal crops on Wayne County farm on which no fertilizer nor manure is used.

Crop	Acreage	Yield per acre	Total yield	Value	Cost of production		
					Cultivation	Harvesting	Total
Corn	10.9	22 *bu.*	240 *bu*	$120	$ 79	$31	$110
Oats	8 2	27 "	221 "	88	56	22	78
Wheat.	13.1	13 "	170 "	153	102	22	124
Hay	14 1	1 *T*	14.1 *T.*	141	27	14	41
Total	46.3			502	264	89	353

The cost of seed is estimated at 2 bushels corn, $1; 16 bushels oats, $6.40; 18 bushels wheat, $16.60, and $6 for clover and grass seed, a total of $32. Deducting this from the total value of crops would leave $470 to be divided between landlord and tenant, or $235 each. The cost of production is computed on the basis of $2 per day for man or team; hence, the $353 estimated as the total cost of production represents 176 days labor. The $235 would pay only $1.34 a day for 176 days labor, part man, part team. At $235 for his share the landlord would receive nearly $5 an acre for the 46.3 acres actually in crops; but, if he receives no other income from the remainder of the farm, it would amount to only about $2.75 an acre for the entire farm, or 6 percent on a valuation of less than $50 per acre. The tenant, of course, will have in addition to his share of the crop the use of house, pasture for team and for a cow or two, range for poultry, a garden and some fruit.

A similar calculation for the rate of crop yields attained at the Experiment Station by the use of commercial fertilizers and lime

without any manure, as shown in Table IV, is given in Table IX, but is based upon two-thirds of the area now under cultivation, divided into a systematic 4-year rotation.

The cost of seed is estimated as the same for this area as for the larger one, as more will be used to the acre and it will be more carefully selected. For example, the farmer who is producing only 13 bushels of wheat to the acre seldom sows more than 4 to 5 pecks of seed, but the Experiment Station has shown that it is unprofitable to sow less than 8 pecks on Wayne County soil. The cost of liming is estimated at $40 per annum, or a little more than $5 per acre for the area in corn, and the cost of fertilizing at $136 for each rotation, which would mean that amount annually, as the four crops would be growing every year.

TABLE IX.—Estimated income from principal crops on Wayne County farm on which fertilizers and lime are used without manure.

Crop	Acreage	Yield per acre	Total yield	Value	Cost of production		
					Cultivation	Harvesting	Total
Corn.....	7.7	57 *bu.*	417 *bu.*	$208	$56	$54	$110
Oats.....	7.7	59 "	454 "	182	52	45	97
Wheat.....	7.7	33 "	254 "	228	60	33	93
Hay..... ..	7.7	2.16 *T.*	16.7 *T.*	167	20	17	37
Total... ...	30.8	.....	.....	785	188	149	337

There is greater reason for the landlord paying half the cost of liming and fertilizing than half the cost of the seed, for the seed is consumed with each crop, but a considerable part of the effect of lime and fertilizers is manifested in crops following those to which the application is made. After deducting, therefore, the cost of seed, lime and fertilizers from the total value of crops there is left $577 to be divided between landlord and tenant.

On this reduced area the labor cost has been a little less than on the entire area first considered, notwithstanding the greater weight of produce to be handled, the total representing 168 days labor, and the tenant's share amounting to $1.70 per day, while the landlord receives more than $9 per acre for the area actually in cultivation, or $3.39 per acre for the entire area of the farm.

Under this scheme of management the cultivated crops occupy but 30.8 acres out of the total of 85 acres in the average Wayne County farm, leaving 54 acres, much of which would be in pasture or permanent meadow. Most Wayne County farmers keep some

livestock; and it is safe to assume that many of them are able to handle such stock, either for milk or meat production, in such a way that the feed consumed will be paid for by the produce, and the manure accumulated during the winter will have cost nothing. Some of these farmers are tenants. Let us now consider what the tenant farmer might accomplish in crop production by following the methods which the Experiment Station has been practicing for 12 years past on the 40-acre field previously described.

If we compute the cost of the manure at merely that of hauling from barn to field, say 50 cents a ton, the total cost of manure, lime, fertilizers and seed in this estimate will be $178 for each rotation, leaving $784 to be divided between landlord and tenant, or $392 for each, which will pay the tenant a little more than $2 a day for his labor and will pay the landlord more than $12 an acre for the land in cultivation, or $4.60 an acre for the entire farm, equivalent to 6 percent on a valuation of $200 an acre for the land in cultivation, or of $76 an acre for the entire farm.

TABLE X.—Estimated income from principal crops on Wayne County farm on which fertilizers, lime and manure are used.

Crop	Acreage	Yield per acre	Total yield	Value	Cost of production		
					Cultivation	Harvesting	Total
Corn	7 7	77 *bu.*	593 *bu.*	$296	$56	$77	$133
Oats	7.7	60 "	462 "	185	52	46	98
Wheat	7.7	34 "	262 "	235	60	34	94
Hay	7 7	3.2 *T.*	24.6 *T.*	246	20	25	45
Total	30.8			962	188	182	370

CONCLUSION

When a man who has been trained in business methods contemplates the investment of his capital and energy in an enterprise, whether it be merchandising, manufacturing or transportation, he first ascertains the probable cost of carrying on the enterprise and the income which may reasonably be expected from it, using such data as have been accumulated from the experience of others in similar work. He realizes that this experience will never be exactly repeated, that there will be vicissitudes due to changing market conditions, to increasing competition from others in the same business, and to other causes; and he knows that unless he keeps himself con-

stantly informed respecting the demands of his market and is ready to meet new conditions as they occur, his enterprise will be a failure.

Before the organization of the agricultural experiment stations the business of farming was little more than a handicraft. For 2,000 years farmers had known that crops were improved by rotation, the growing of clover and the use of manure, but the real reasons for this improvement have been discovered since the middle of the last century, and not until our own day has it been possible to point out with any approach to definiteness the outcome to be expected from a given treatment on a given soil. Through the long-continued field experiments which have been conducted on soils of different character, and through the classification of soils which has been accomplished by soil surveys, it is now possible for the farmer to form as dependable a forecast of the probable outcome of certain methods of treatment as any which can be made in any other line of business.

This is especially true with reference to the Wayne County farmer. The Experiment Station has been conducting on this soil for 23 years a line of investigation covering a wide range of questions relating to the agriculture of this region; and for a considerable part of that period has carried on similar investigations on other soil formations throughout the State which, by the differences as well as by the agreements in their outcome, confirm and render more dependable the results of the work done on this soil.

Of course, the figures given in the foregoing tables will never be exactly duplicated on any Wayne County farm. Farms vary in size, in the relative areas devoted to cultivation, in distance from railways and from improved highways—an important point in the use of lime or in marketing produce—in their need for drainage, and in the depletion which they have suffered from previous management; and farmers differ in their ability to make effective use of improved methods. Seasonal conditions and prices also vary from year to year. Farming, moreover, does not consist solely in soil management. Intelligence in selecting the best varieties of crops, in improvement of seed and of methods of culture—all points on which the Experiment Station offers the assistance of long-continued, careful investigation—are necessary to the highest success. Individual farmers over the county are already accomplishing all that has been suggested on the previous pages and many more will follow, while enough others will continue in the old ways to prevent any danger of glutting the market by a sudden overproduction.